Structural health monitoring of the metallic plate using guided waves: An experimental study.

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Summary: Structural health monitoring is implemented to monitor the structural integrity of the structure. The guided wave technique was utilised to investigate the health status of the aluminium plate. The wave was actuated at 6 kHz using a PZT actuator and recorded using the optical fibre sensor. The wave was recorded on the intact plate at 2- and 4-mm thickness. Three different defect depths were introduced on the 4 mm plate's thickness, and three different defect widths were introduced on the 2 mm plate's thickness. The recorded waves measured on the 1/3, 2/3, and 3/3 of the defect depths show a wave amplitude decrement of 72%, 84%, and 88%, respectively, compared to the wave amplitude of the intact plate. For the defect widths of 1, 1.5, and 2 cm, the decrement of the wave amplitude was 83%, 87%, and 94%, respectively. The severity of the structure can be monitored by the decrement of the wave amplitude. The finding shows that the guided wave approach is able to be utilised as one of the promising techniques to monitor the structural integrity of the metallic structure.

1. Introduction

Lamb wave methods have shown to be promising and commonly used approaches in various application areas among SHM-based techniques [1][2][3]. The changes in structural geometry of the structure, including internal and surface damage, are the essential aspect that can alter the properties of the propagated Lamb wave. Thus, the health status of the structure can be monitored based on the changes in wave propagation [4]. This study is performed to investigate